

# Traffic Noise Abatement by Diamond Grinding in Ohio

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# Presented By:

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# Objective:

- to identify traffic noise level and frequency differences due to the re-texturing of the concrete pavement surface by grinding.

# Surface texture before diamond grinding

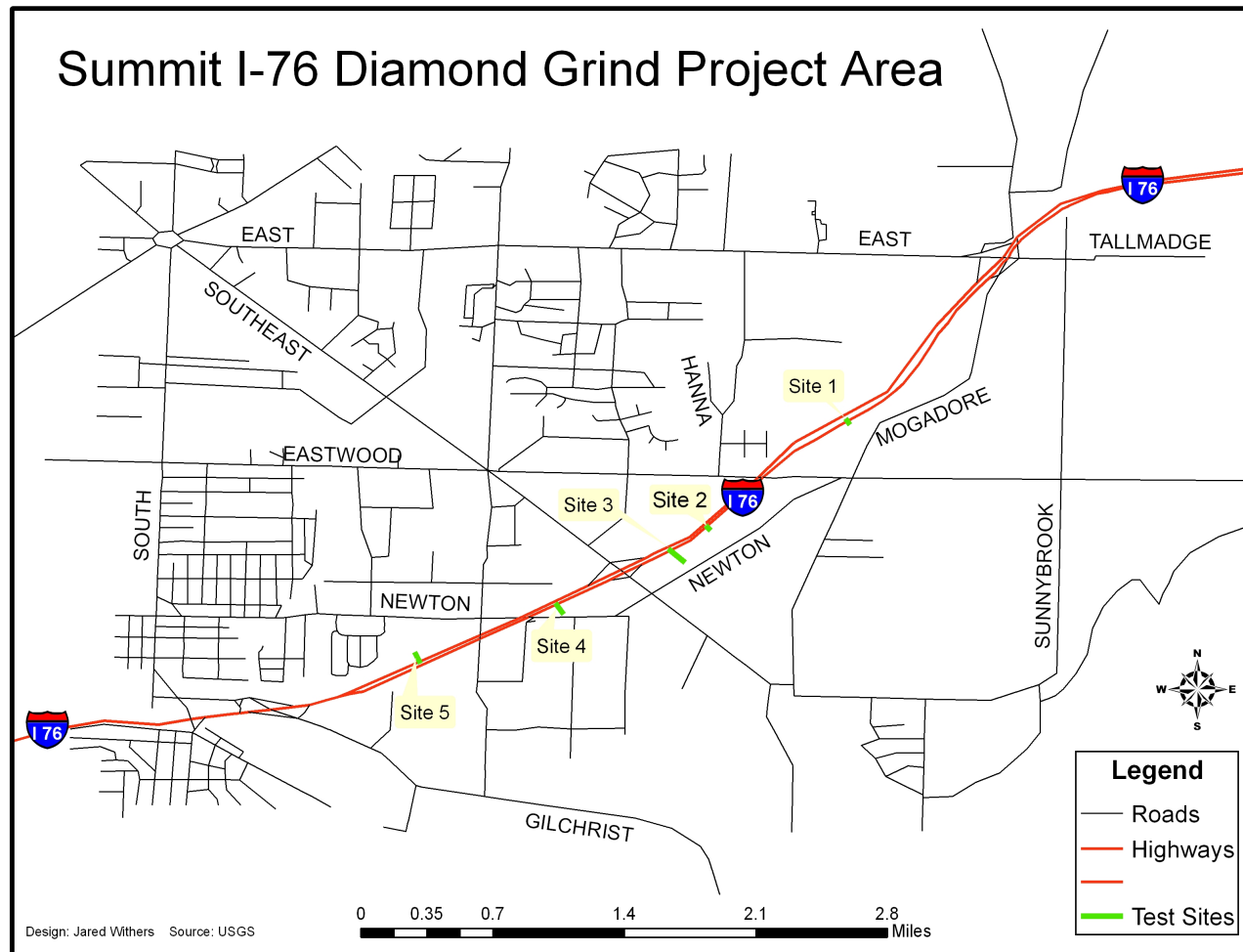




# Surface texture after diamond grinding



# Project area map showing site locations





# RTA and DAT Recorders



# 7.5 and 15 meter microphones



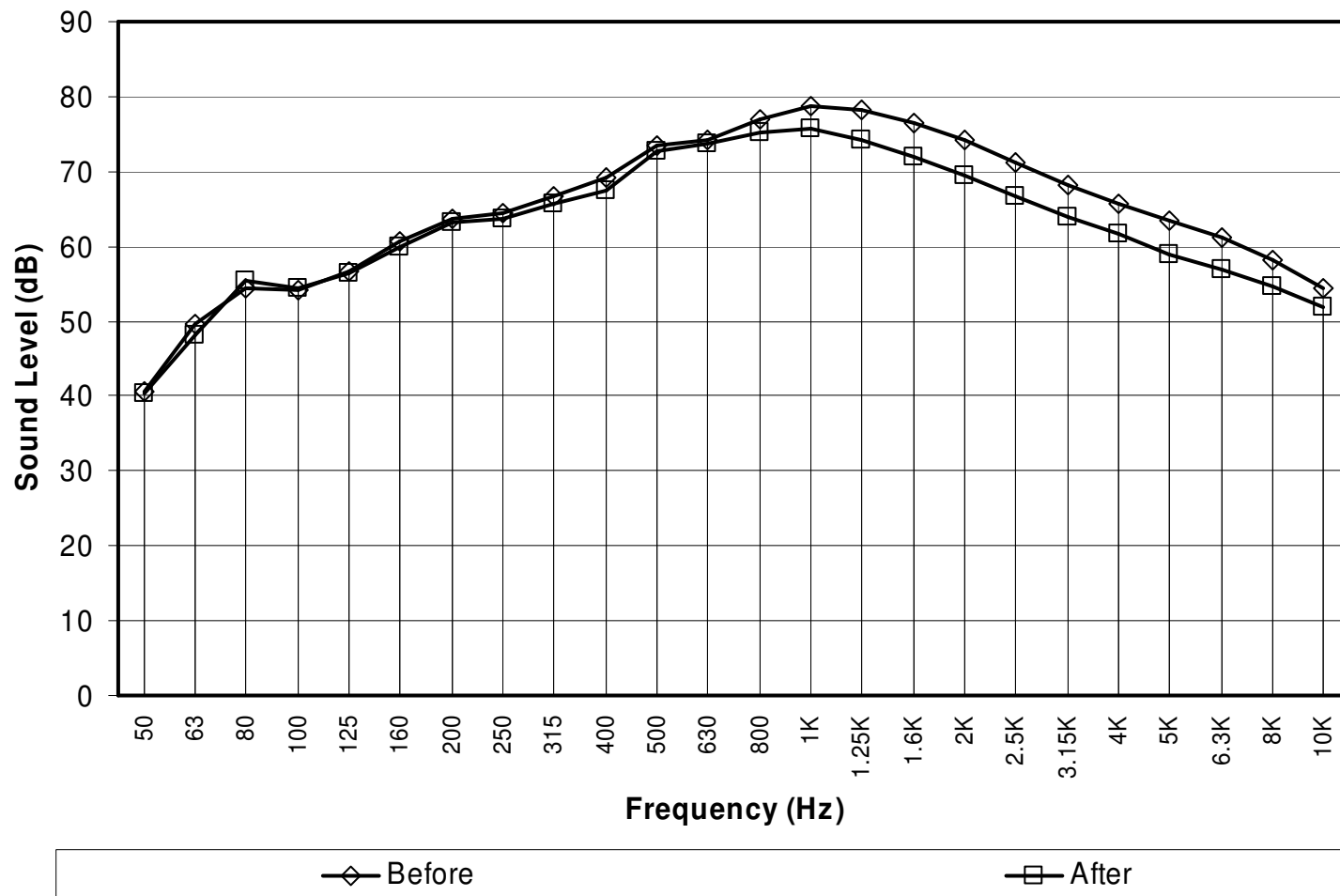


# Environmental monitoring equipment



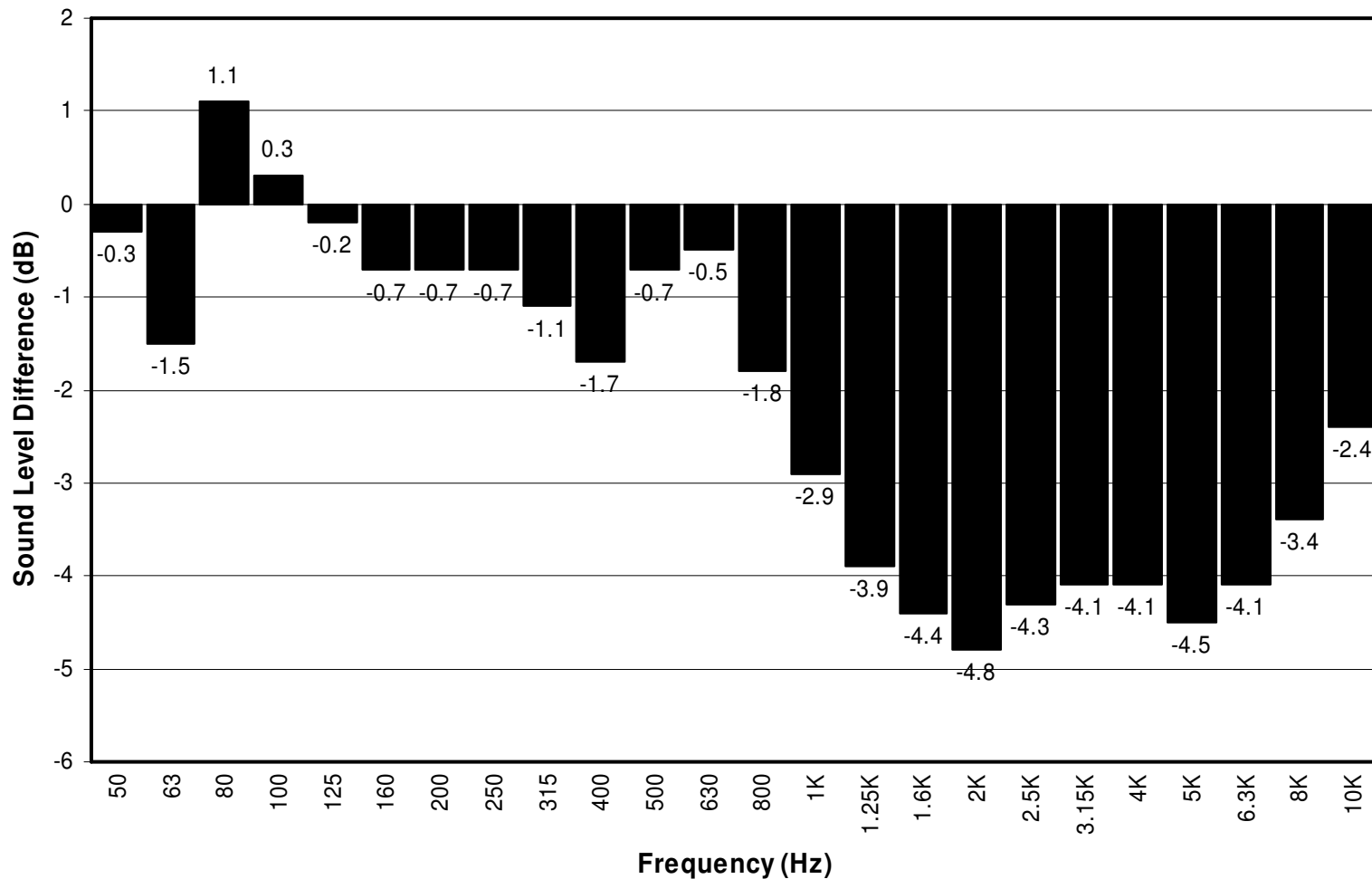
# Equivalent continuous sound level measured before and after diamond grinding

Site 1 Mic 1 (7.5m)



# The difference in equivalent continuous sound level

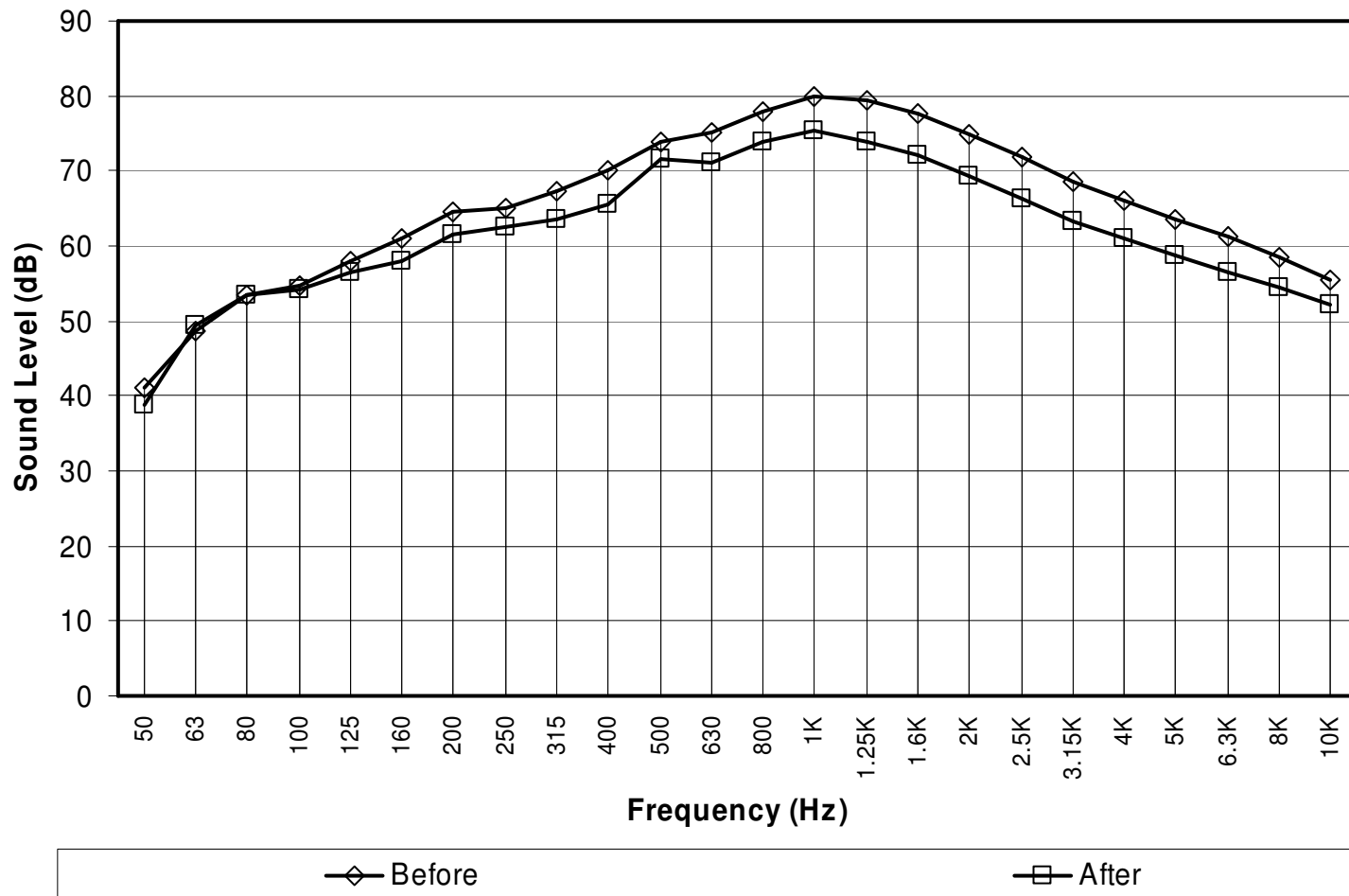
Site 1 Mic 1 (7.5m) Difference





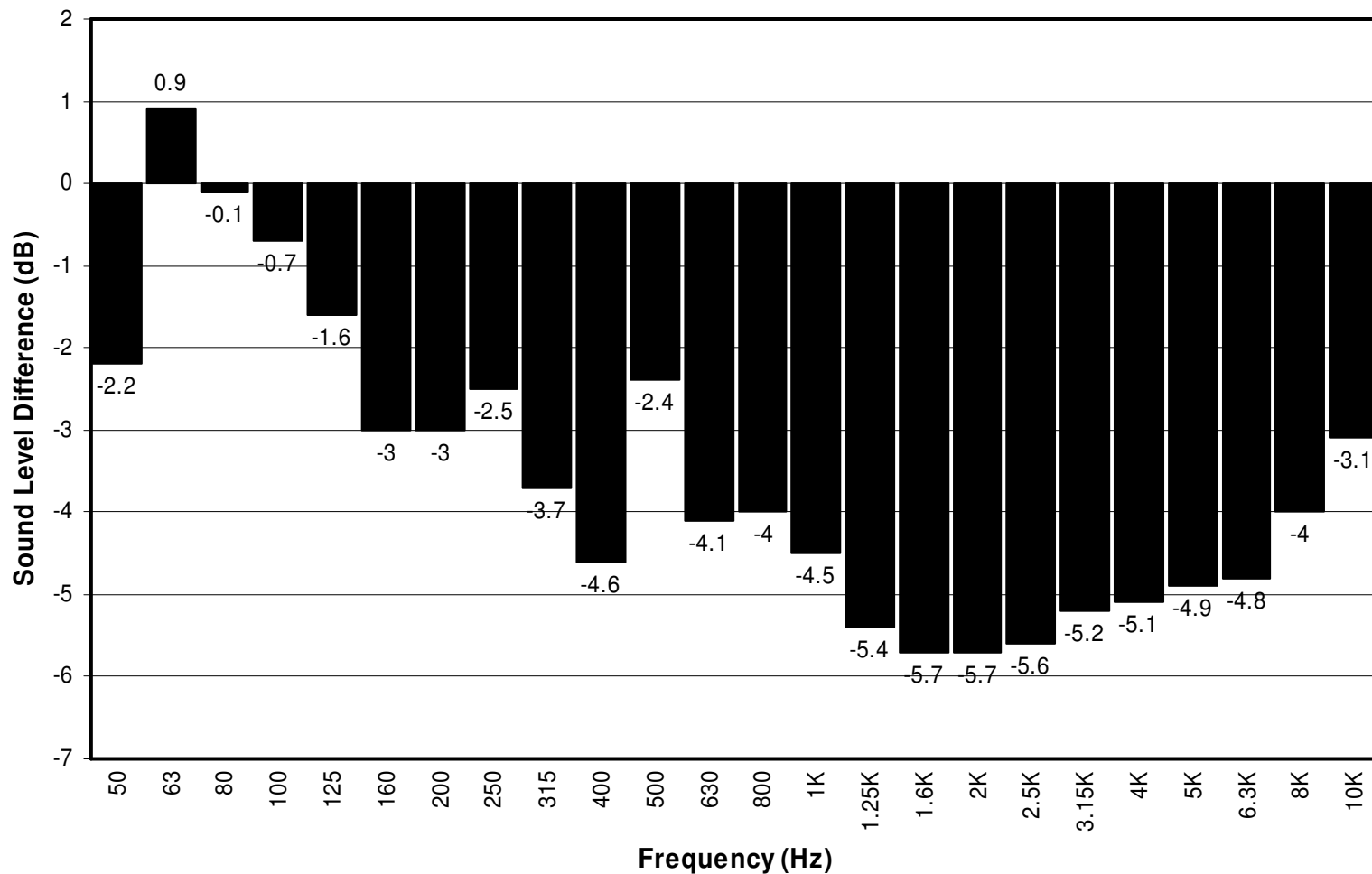
# Equivalent continuous sound level measured before and after diamond grinding

Site 5 Mic 1 (7.5m)

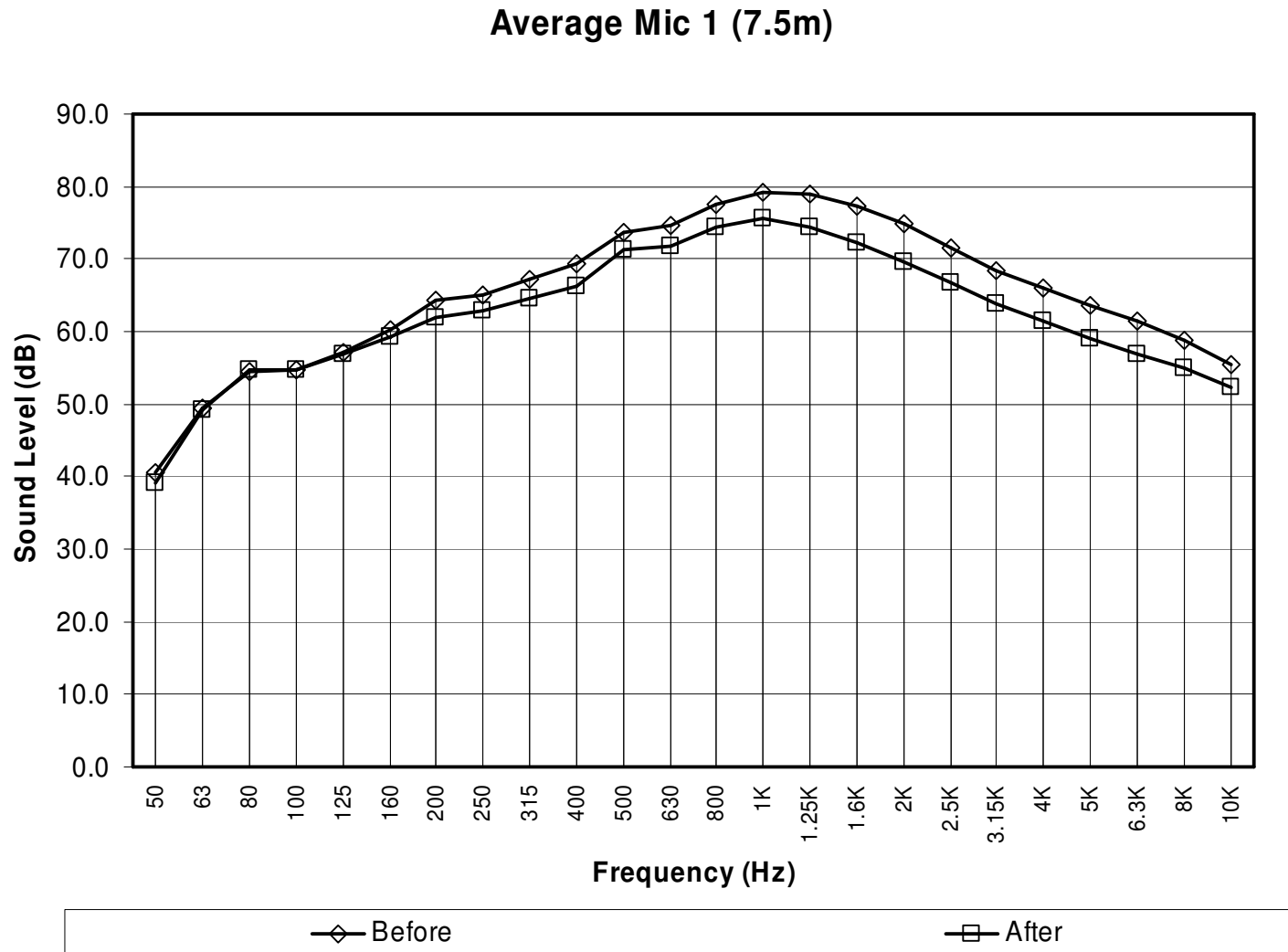


# The difference in equivalent continuous sound level

Site 5 Mic 1 (7.5m) Difference



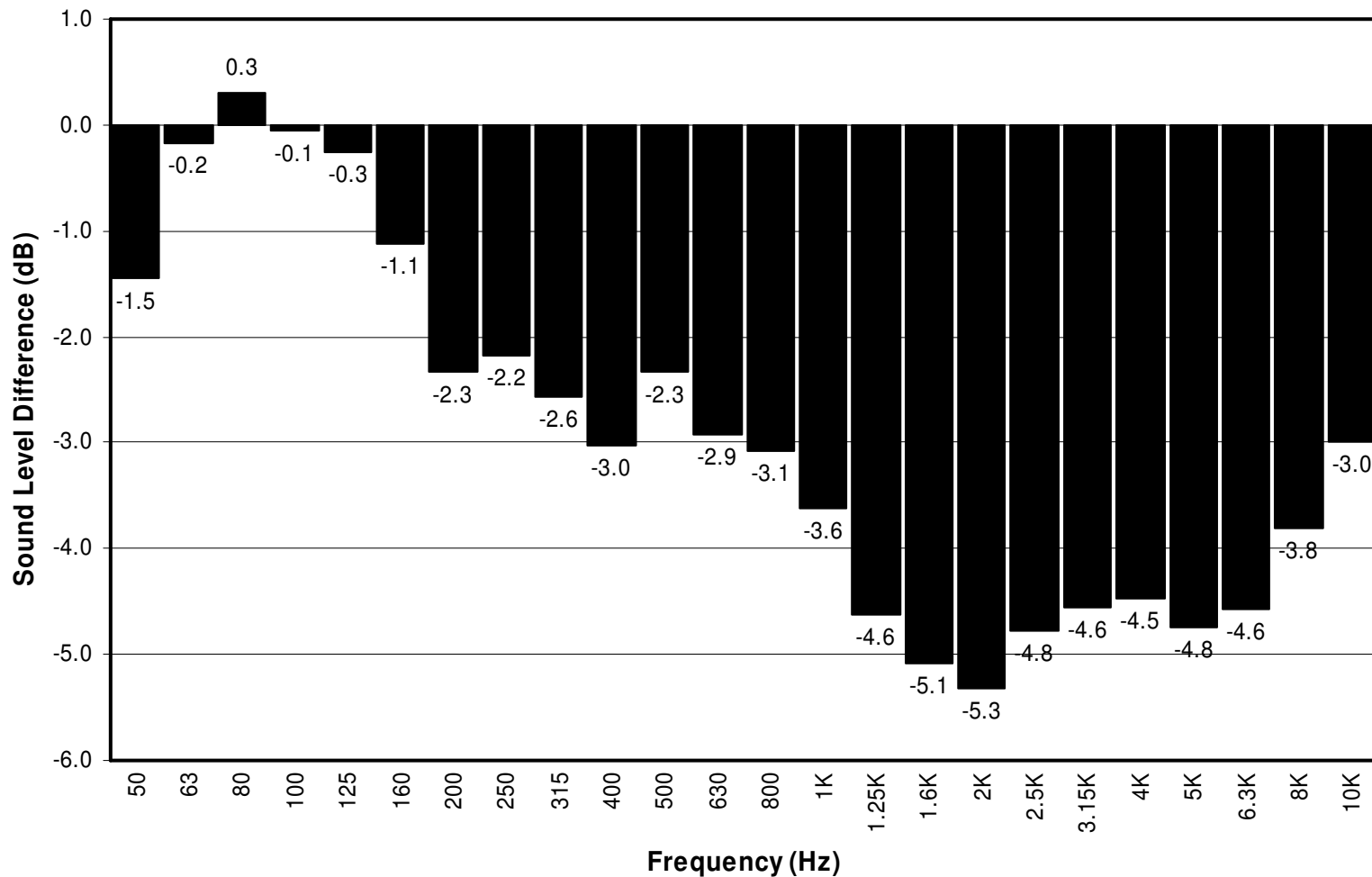
# Average equivalent continuous sound level measured before and after diamond grinding



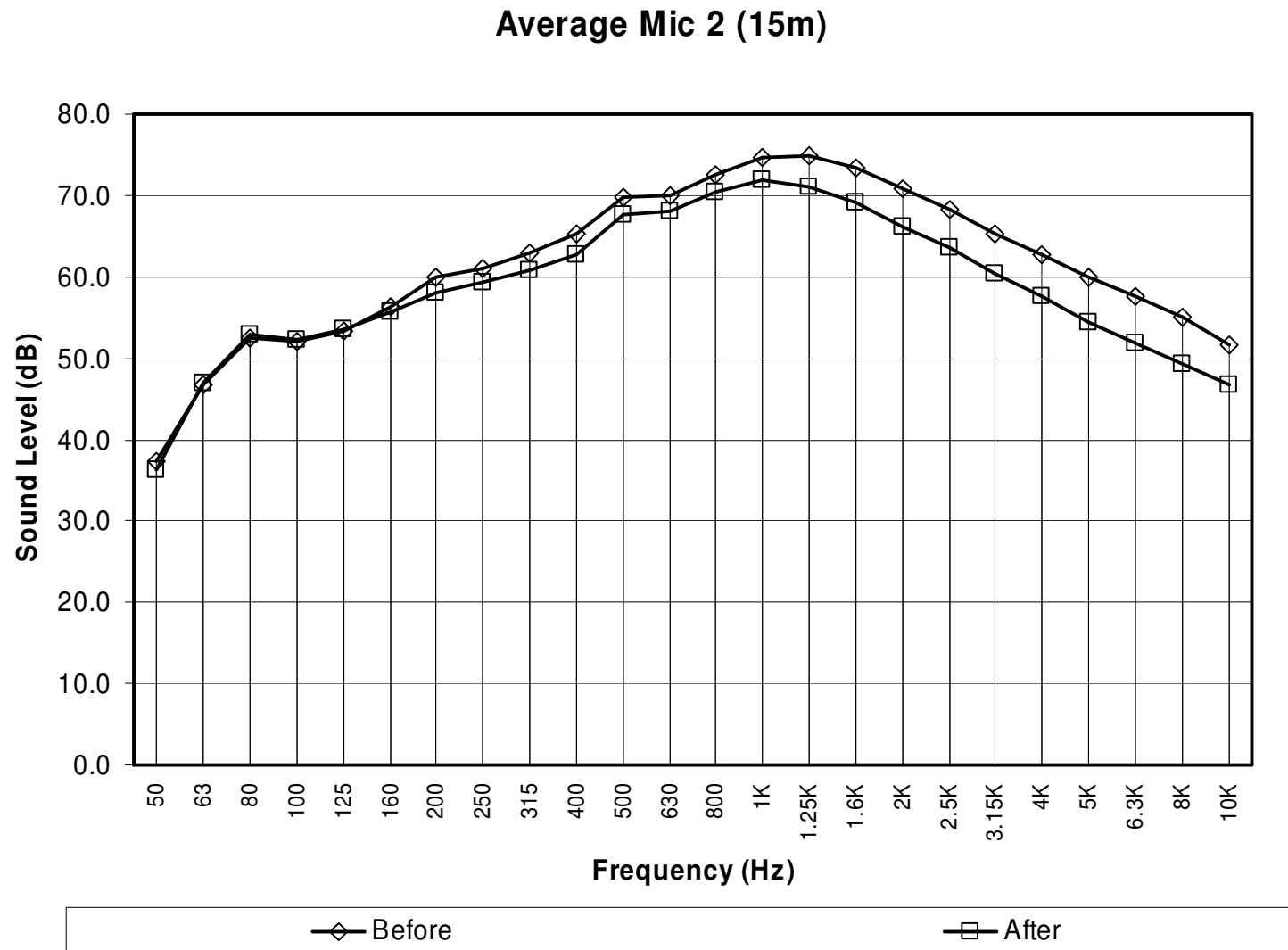


# Average equivalent continuous sound level difference

Mic 1 (7.5m) Average Difference

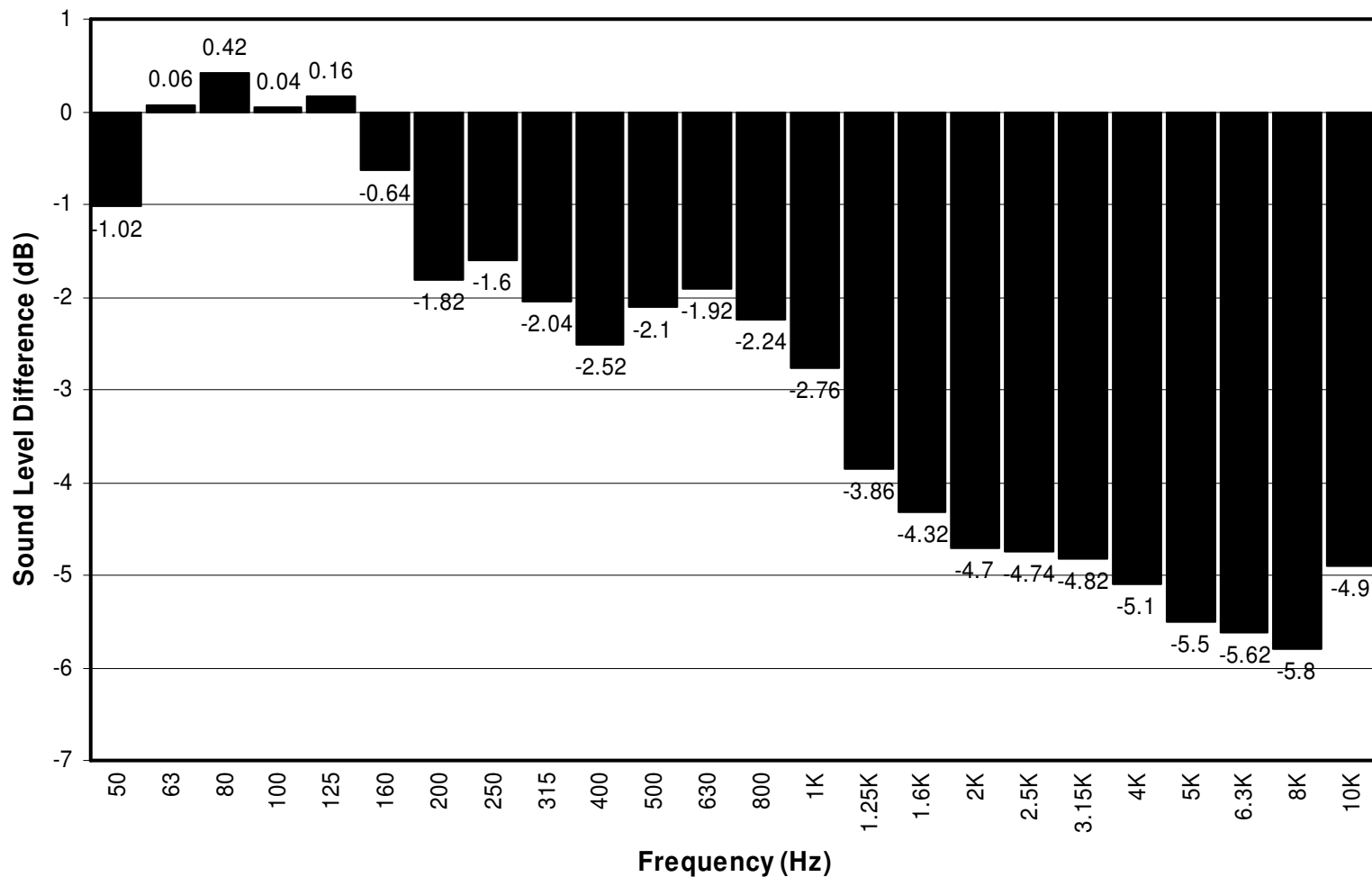


# Average equivalent continuous sound level measured before and after diamond grinding



# Average equivalent continuous sound level difference

Mic 2 (15m) Average Difference



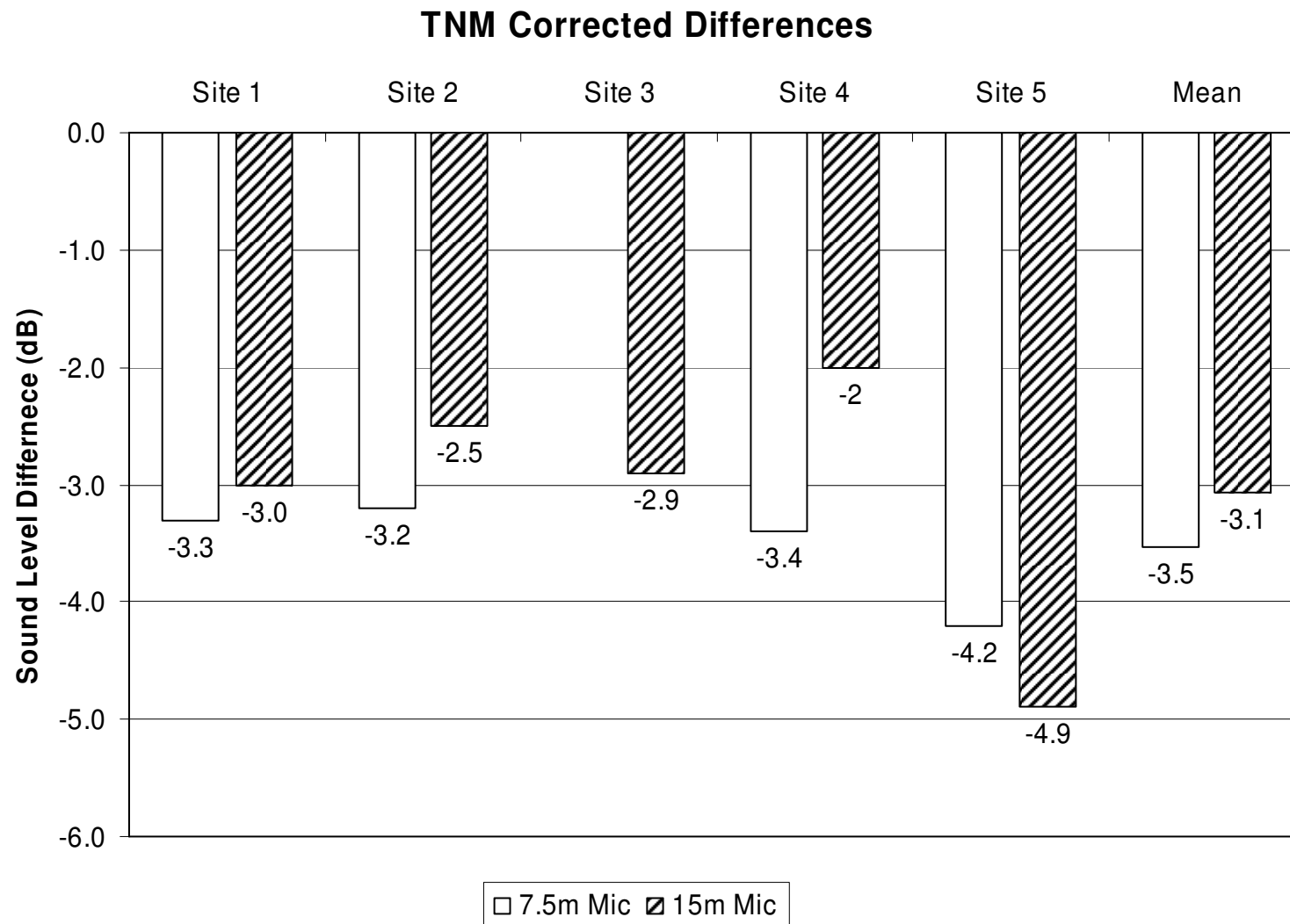


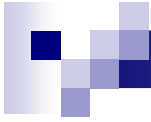


# TNM Simulation Results

	Sound Level (dB)	
	7.5m	15m
<u>Site 1</u>		
Before.....	78.2	74.1
After.....	78.8	74.7
Difference.....	0.6	0.6
<u>Site 2</u>		
Before.....	78.3	74.6
After.....	77.7	73.8
Difference.....	-0.6	-0.8
<u>Site 3</u>		
Before.....	78.1	74.1
After.....	78.2	74.1
Difference.....	0.1	0.0
<u>Site 4</u>		
Before.....	78.3	74.5
After.....	77.6	73.7
Difference.....	-0.7	-0.8
<u>Site 5</u>		
Before.....	78.5	74.1
After.....	78.1	74.5
Difference.....	-0.4	0.4

# TNM corrected differences in before and after broadband traffic noise levels





# Conclusions

- The average reduction in broadband noise at 7.5 m was 3.5 dB (3.2 dB to 4.2 dB range), and the average reduction at 15m was 3.1 dB (2 dB to 4.9 dB).





## Conclusions continued...

- Spectrum analysis showed the greatest reduction in noise occurred at frequencies above 1 kHz and that the retexturing had little to no effect on frequencies less than 200 Hz



Questions???



# Average environmental conditions

	Average Ambient Temp (°C)	Average Pavement Temp (°C)	Average Relative Humidity (%)	Average Wind Speed (km/h)	Average Wind Direction
<u>Site 1</u>					
Before.....	27	28	61	7	ENE
After.....	8	4	70	2	SSE
<u>Site 2</u>					
Before.....	27	28	82	8	WNW
After.....	8	7	71	2	S
<u>Site 3</u>					
Before.....	22	24	63	2	S
After.....	9	2	56	4	S
<u>Site 4</u>					
Before.....	24	30	55	8	WSW
After.....	3	4	76	2	W
<u>Site 5</u>					
Before.....	21	24	62	3	NNE
After.....	7	3	76	5	ESE

# Measurement system calibration





# Measurement system calibration



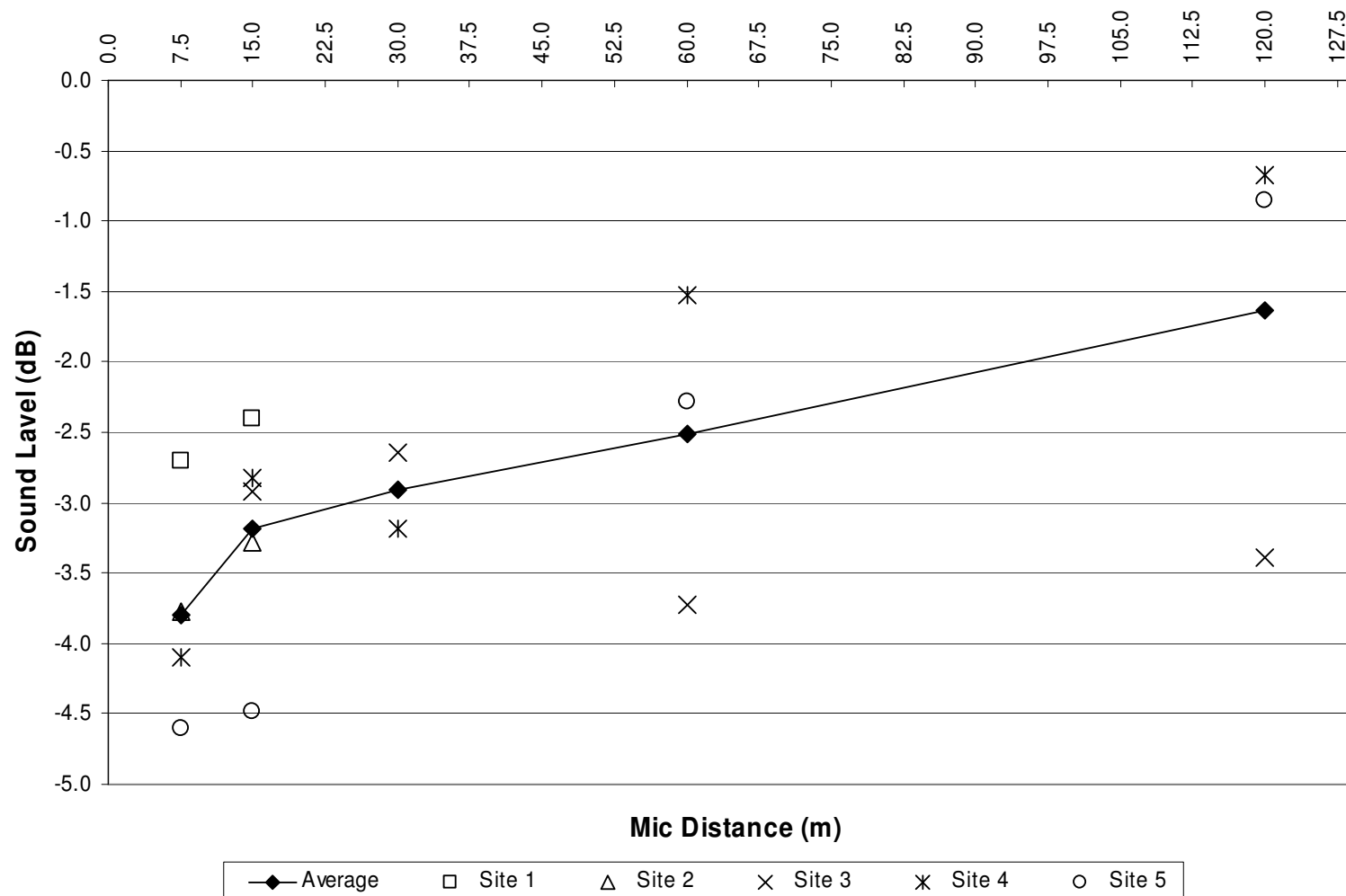
# Distant Receivers





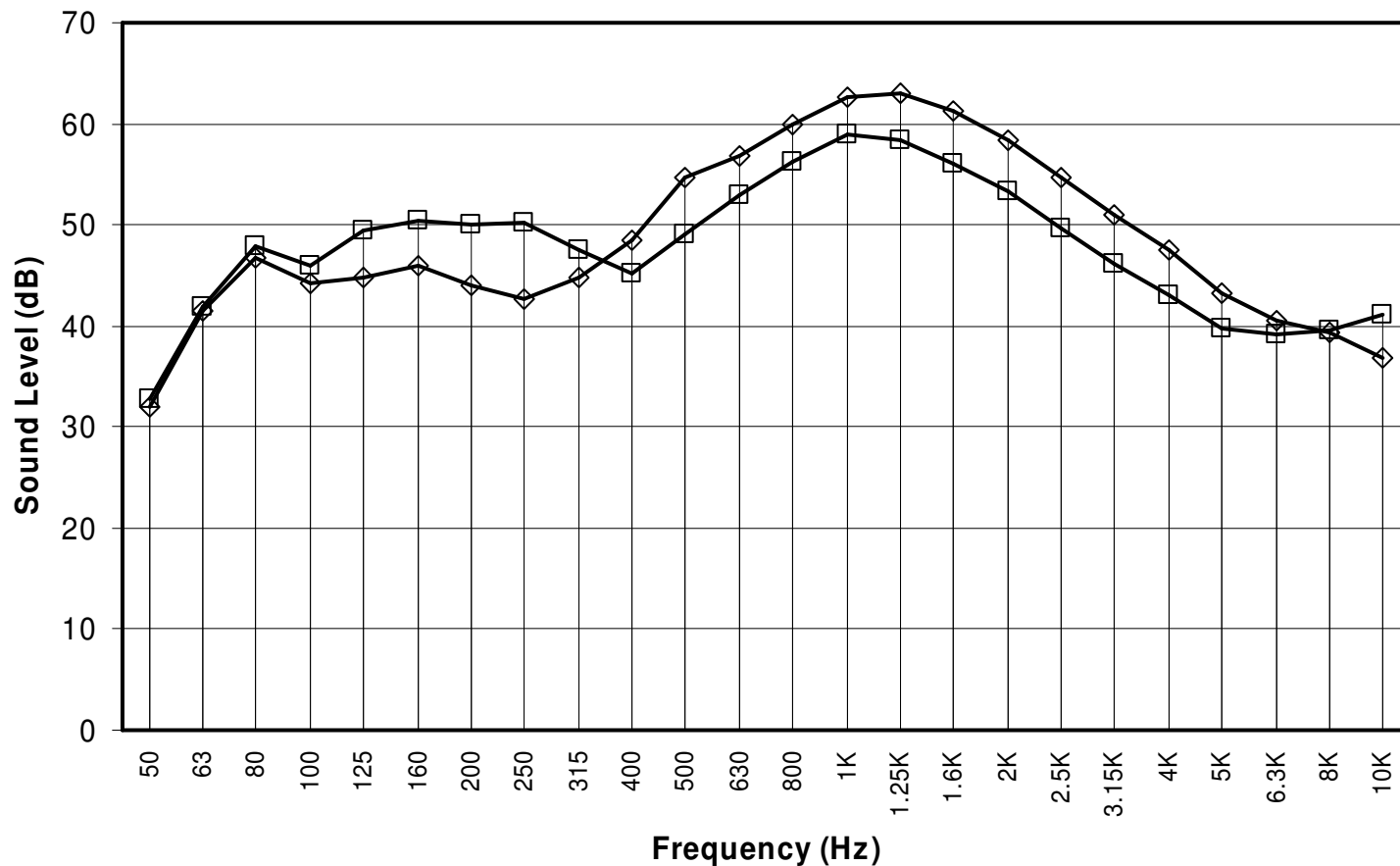
# The differences in broadband levels between before and after diamond grinding

Difference Between Before and After Broadband Levels



# Equivalent continuous sound level measured before and after diamond grinding

Site 3 Mic 4 (60m)

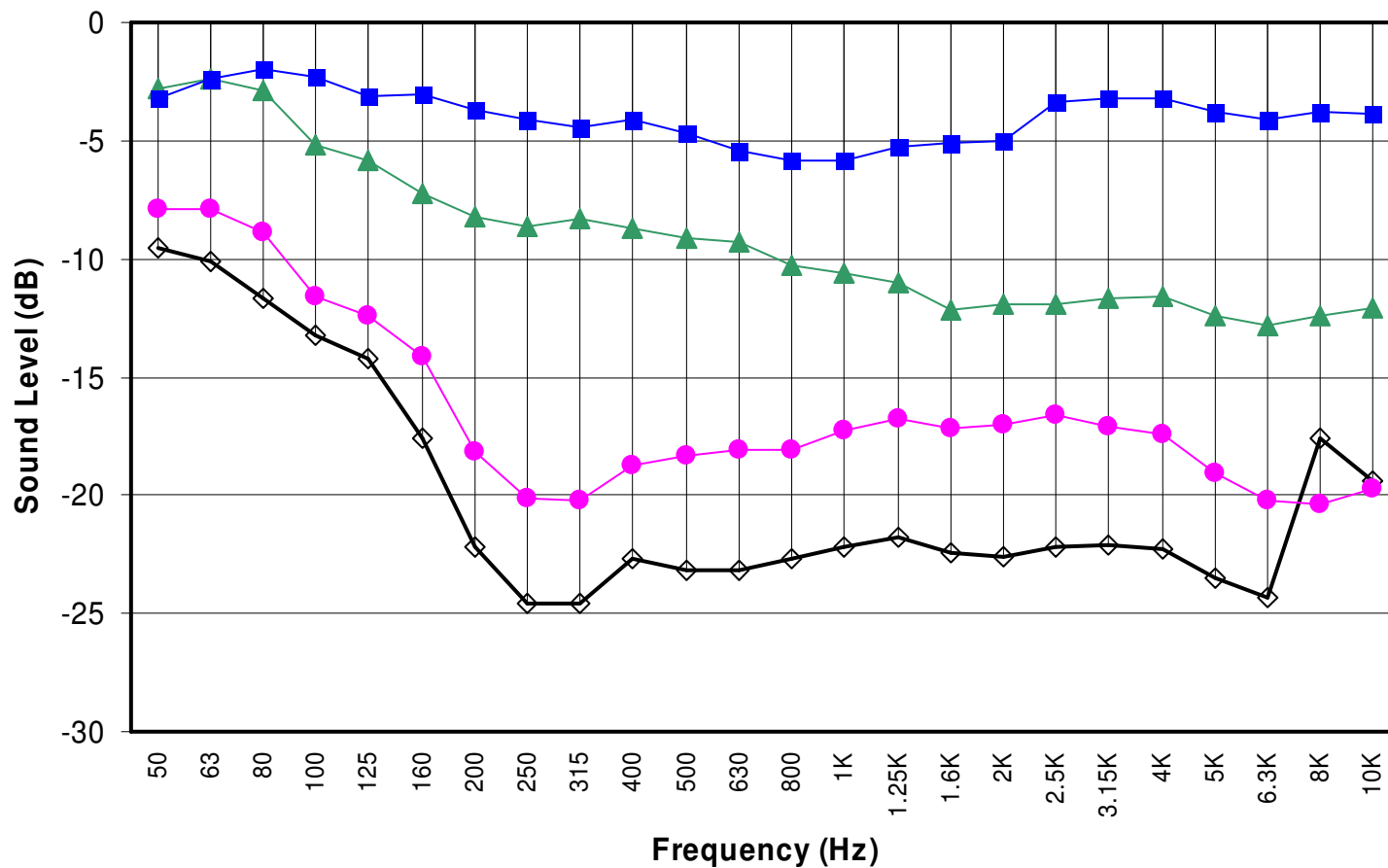


—◇— Before

—□— After

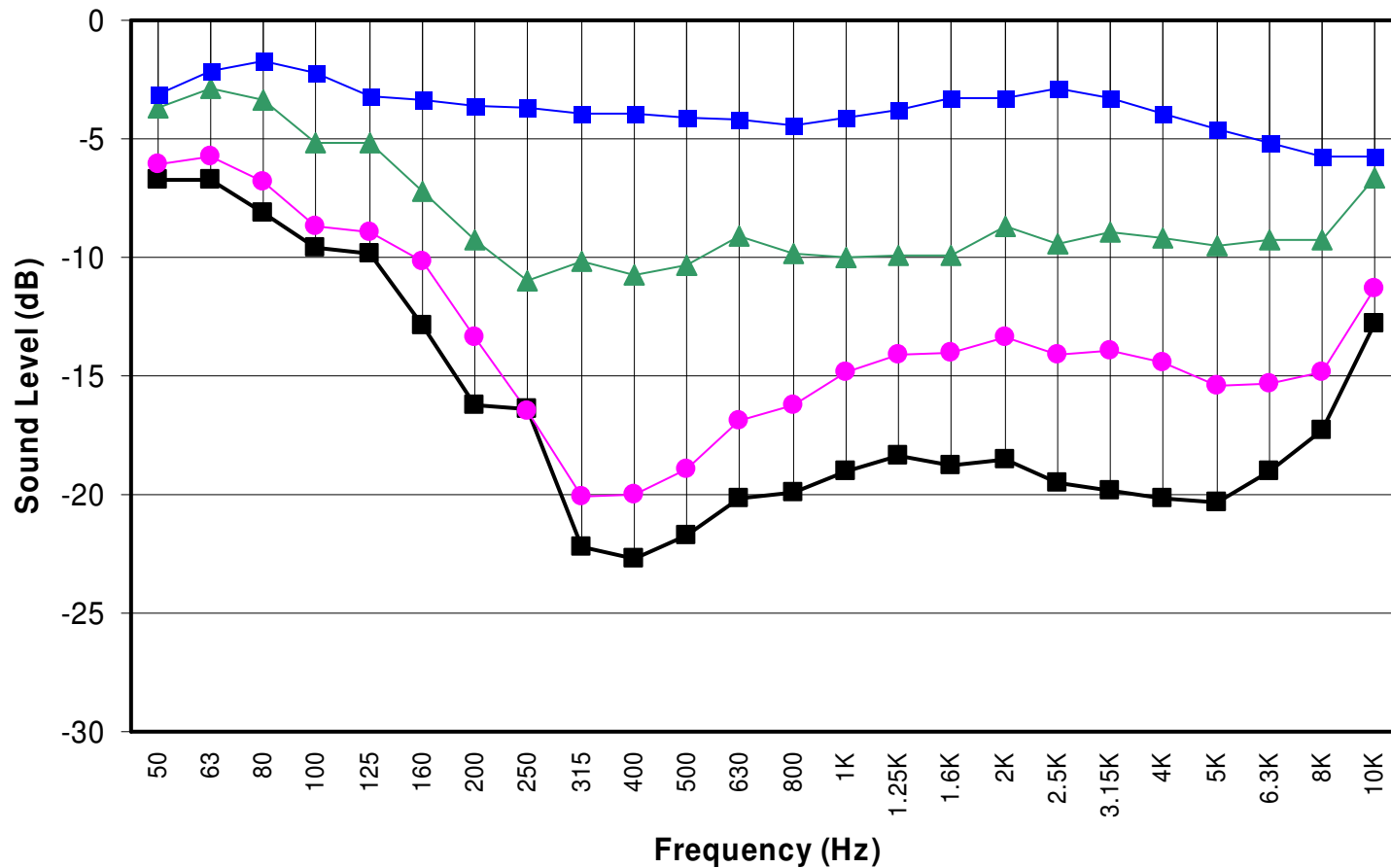
The difference in noise levels, before diamond grinding, between the 7.5 m microphone position and each of the more distant microphone

Propagation Attenuation, Site 4, Before



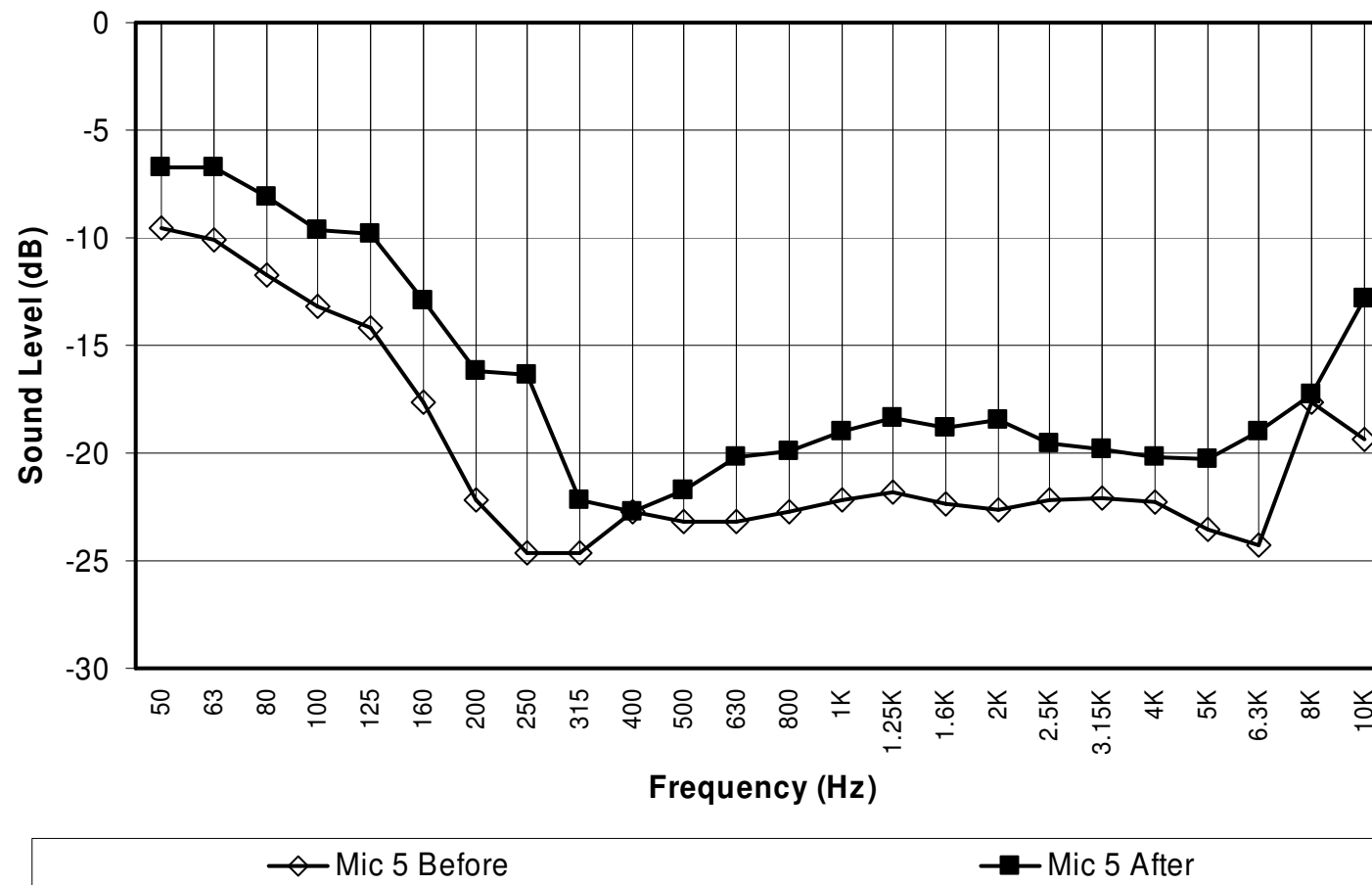
The difference in noise levels, after diamond grinding, between the 7.5 m microphone position and each of the more distant microphone positions

Propagation Attenuation, Site 4, After



The difference in noise levels between the 7.5 m and 120m microphone position before and after diamond grinding

Propagation Attenuation, Site 4, Mic 5 (120m)



# Equivalent continuous sound level compensated for calculated propagation attenuation differences

Site 4 Mic 5 (120m) - Distance Attenuation Corrected

